


PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Applicant(s): Anwar Chitayat, *et al.*

Examiner: Burton S. Mullins

Serial No: 09/817,622

Art Unit: 2834

Filing Date: March 26, 2001

Title: SYSTEM AND METHOD TO CONTROL A ROTARY-LINEAR
ACTUATOR

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REPLY BRIEF

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Dear Sir:

Applicants' representative submits this Reply Brief in response to the Examiner's Answer mailed December 17, 2004. A Request for Oral Hearing is being submitted concurrently herewith. Further, a credit card payment form is filed concurrently herewith in connection with all fees due regarding the Request for Oral Hearing. In the event any additional fees may be due and/or are not covered by the credit card, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1063 [ALBRP140USB].

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A. Rejection of Claims 1-4, 6-10 and 17-21 Under 35 U.S.C. §103(a)

Claims 1-4, 6-10 and 17-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kemmer *et al.* (US 4,234,831) in view of Spinner *et al.* (US 5,771,174) and Mizutani (US 5,532,533). Withdrawal of this rejection is respectfully requested for at least the following reasons. The combination of Kemmer, Spinner *et al.* and Mizutani fails to teach or suggest all the limitations set forth in the subject claims, and further, there is no motivation to combine the references other than *via* employment of applicants' specification as a 20/20 hindsight-based roadmap to achieve the purported combination.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) *must teach or suggest all the claim limitations*. See MPEP §706.02(j). The *teaching or suggestion to make the claimed combination* and the reasonable expectation of success *must be found in the prior art and not based on the Applicant's disclosure*. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

Independent claims 1 and 17 recite similar claim limitations, namely, *a control system* that is *integrated with an amplifier*; the control system together with the integrated amplifier further includes a network interface operative to receive control information. The control system controls the amplifier to selectively energize coils to effectuate movement in a plunger based on control information received *via* the network interface. The *control system* having a network interface and the *integrated amplifier* is further *integrated with a rotary-linear motor* to form *a single module*; applicants' claimed invention is a single module comprising all the components of a rotary-linear actuator, *e.g.*, a plunger, a coil system and amplifier as recited in the subject claims, as well as the components that comprise the controller. Kemmer *et al.*, Spinner *et al.* and

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Mizutani, either alone or in combination, fail to teach or suggest these novel features of combination, fail to teach the claimed invention.

Kemmer *et al.* discloses a compound rotary and/or linear motor comprising two or more primary and interposed magnet systems of which at least one is variable by an electronic control system which at least one system to generate rotary and/or linear motion. As the Examiner's Answer acknowledges, Kemmer *et al.* is silent with respect to both a network interface operative to receive control information and a control system that is integrated with a rotary-linear motor to form a single unit. Further, as was stated in the Appeal Brief and is reiterated herein, Kemmer *et al.* does not teach or suggest a control system that is integrated together with the rotary-linear motor to form a single unit that includes an amplifier to selectively energize the coils.

The Examiner asserts that Kemmer *et al.* provides an amplifier in Fig. 4. However, applicants' representative disagrees. It would appear that the cited document rather than providing an amplifier, discloses an analog-to-digital converter that converts digital control signals to analog signals to be utilized by switching transistors. The claimed invention in contrast provides an amplifier that delivers a desired level of electrical current to the coils, *e.g.*, the amplifier as recited in the subject claims amplifies the electrical current to the coils rather than converting the signal received from digital to analog. Thus, Kemmer *et al.* is distinguishable from applicants' claimed invention on this ground.

In recognition that Kemmer *et al.* is deficient in failing to teach a network interface operative to receive control information and a control system that is integrated with a rotary-linear motor to form a single unit, the Examiner provides Spinner *et al.* and Mizutani. The Examiner posits that Spinner *et al.* provides a network interface to receive control information to control the amplifier to selectively energize the coils, and that Mizutani discloses a control system and associated rotary-linear motor integrated into a single module. Applicants' representative avers to the contrary.

Spinner *et al.* provides a distributed intelligence control system for controlling a cross direction profile characteristic of a traveling sheet, such as paper. The Examiner contends that the cited document discloses a network interface operative to receive

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control information and indicates that this component may be located in Figure 4. Applicants' representative acknowledges that a network interface is provided in Figure 4 and that this network interface is part of the controller. However, contrary to the Examiner's assertions, the controller depicted in the Figure 4 is not the control system recited in the subject claims. In particular, the controller disclosed in *Spinner et al.*, unlike applicants' claimed invention, is not integrated with an amplifier and is not operative to control an amplifier because such an amplifier is not disclosed in the cited document. Thus, since *Spinner et al.* does not disclose the use of an amplifier to provide electrical energy to energize coils, it is submitted that the cited document cannot possibly teach or suggest controlling the amplifier to selectively energize the coils to effect movement of the plunger based on the control information received via the network interface.

With respect to the Examiner's contention that Mizutani discloses a control system and associated rotary-linear motor integrated into a single module, Mizutani provides a servo motor integral with a control apparatus used with a numerically controlled machine tool. A servo motor, i.e., a motor whose output shaft does not rotate freely but moves to a certain angular position, is distinct from a rotary-linear motor that effectuates both rotational and linear movement as provided in the subject claims. Thus, it is submitted that it would not have been obvious to one of ordinary skill in the art to combine Mizutani with *Kemmer et al.* and *Spinner et al.* since Mizutani does not pertain to rotary-linear motors.

It is generally recognized that in order to establish obviousness there must be some teaching or support in the cited documents themselves to produce the claimed invention. Here, neither the nature of the problem to be solved, the teachings in the cited documents, nor the knowledge of persons of ordinary skill provides sufficient suggestion or motivation to combine the references. Instead it is submitted that the Examiner has relied upon impermissible hindsight in reaching an obviousness determination. The Federal Circuit has held that to impel one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is fall victim to the insidious effect of 20/20 hindsight wherein

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that which only the inventor taught is used against its teacher. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 USPQ2d (BNA) 1596 (Fed. Cir. 1998) (citations omitted). *Kemmer et al.*, *Spinner et al.* and *Mizutani* cannot be combined to make the present invention obvious because there is no proper suggestion or motivation to combine the reference teachings to create the subject matter of claims 1 and 17. *Kemmer et al.* is directed to providing a simplified arrangement for a compound rotary and/or linear motor; *Spinner et al.* relates to allowing peer-to-peer communications take place between slice lip profile actuators such that an algorithm resident in each actuator can make target value decisions based on information received from its peers; and *Mizutani* is directed to a servo motor integrated with a control apparatus to be used with a numerically controlled machine tool. Accordingly, it appears that the purported combination of references is based on impermissible hindsight, in which the present application provides both the teaching and the motivation to combine.

In view of at least the foregoing, the combination of *Kemmer et al.*, *Spinner et al.* and *Mizutani*, either alone or in combination, does not teach or suggest all the limitations set forth in the subject claims and that this rejection with respect to independent claims 1 and 17, and associated dependent claims, should be withdrawn.

B. Rejection of Claims 11-15 Under 35 U.S.C. §103(a)

Claims 11-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Sudo et al.* (US 4,644,205) in view of *Spinner et al.* (US 5,771,174) and *Mizutani* (US 5,532,533). This rejection should be withdrawn for at least the following reasons. *Sudo et al.*, *Spinner et al.* and *Mizutani*, either alone or in combination, fail to teach or suggest each and every limitation recited in the subject claims.

As stated *supra*, applicants' claimed invention is a single integrated module comprising all the components of a rotary-linear actuator, *e.g.*, a motor support, a plunger, an array of permanent magnets associated with the plunger, a first set of coils and a second set of coils to effectuate both rotational and linear movement of a plunger as well as the components that comprise the control system. In particular, independent claim 11

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recites an array of permanent magnets disposed on a plunger such that half of the magnets are oriented so that their north poles are oriented radially outwards and the other half such that their north poles are oriented inwards. In addition, claim 11 recites an integrated control system that selectively energizes first and second sets of coils to effect movement of a plunger. Sudo *et al.*, Spinner *et al.* and Mizutani fail to teach or suggest these exemplary features of applicants claimed invention.

Sudo *et al.* discloses a magnetic suspension-positioning device comprising a cylindrical stationary member and a cylindrical floating member arranged coaxially with the stationary member. However, contrary to the Examiner's assertion, Sudo *et al.* does not provide a plunger with an arrangement of magnets disposed in the manner recited in the subject claim. Rather, Sudo *et al.* discloses that the magnets associated with the floating member are circumferentially spaced such that their poles lie along the circumferential arc of the floating member. This is clearly distinguishable from the invention as claimed wherein the array of magnets are arranged on the plunger so that half of the magnets' north poles point radially inwards and the other half their north poles are oriented radially outwards. Thus, Sudo *et al.* is deficient in this respect.

In addition, the Examiner contends that Sudo *et al.* provides an integrated control system that selectively energizes the first and second set of coils. However, the control system disclosed in the cited document is in no way integrated to the magnetic suspension-positioning device disclosed therein. Rather, observation of Figures 2 and 10 and perusal of col. 4, lines 34-36 indicates that the control system is connected to the magnetic suspension-positioning device through an electrical cord. In contrast, the claimed invention discloses that the integrated control system and the rotary-linear motor are integrated into a single unit. Thus, it is submitted Sudo *et al.* is further deficient in this regard.

Moreover, the Examiner concedes that Sudo *et al.* fails to teach or suggest a network interface operative to receive control information *via* an associated network, and that the control system and associated rotary-linear motor are integrated into a single module. In an attempt to rectify the deficiencies rendered by Sudo *et al.* the Examiner offers Spinner *et al.* and Mizutani; Spinner *et al.* is offered to teach a network interface,

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and Mizutani to provide the integration of all the components into a single module. However, it is submitted that in the face of the deficiencies identified in Sudo *et al.*, neither Spinner *et al.*, nor Mizutani makeup for these identified deficiencies and that the rejection of independent claim 11 (and claims that depend there from) should be reversed.

C. Rejection of Claims 1-4, 6-10 and 16-21 Under 35 U.S.C. §103(a)

Claims 1-4, 6-10 and 16-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sudo *et al.* (US 4,644,205) in view of Spinner *et al.* (US 5,771,174), Gerard (US 4,751,437) and Mizutani (US 5,532,533). Reversal of this rejection is respectfully requested for at least the following reasons. Sudo *et al.*, Spinner *et al.*, Gerard and Mizutani, either individually and/or in combination, do not teach or suggest each and every limitation recited in the subject claims.

Independent claims 1, 16 and 17 recite a similar claim limitation, namely: *a plunger movable along and rotatable about a longitudinal axis extending through the plunger, wherein the plunger is supported against a motor support via bearings*. It is apparent that the plunger as recited in the subject claims is supported against a motor support with bearings. None of the documents cited by the Examiner disclose the use of bearings to support the plunger against a motor support.

The Examiner nevertheless asserts that Sudo *et al.* teaches an electromagnetic bearing. Sudo *et al.* utilizes coils and electromagnets to levitate a floating member over a corresponding stationary member, but fails to disclose a plunger supported against a motor support *via* bearings, and moreover fails to provide a facility to dispose of bearings between the floating member and the stationary member. The invention as claimed on the other hand, utilizes bearings to ensure that the plunger is supported against the motor support and in order to facilitate this support provides grooves through which bearings can be disposed. In view of this deficiency, applicants' representative contends that the Examiner is clearly utilizing applicants' specification as a 20/20 hindsight based roadmap to achieve the purported invention. In essence, Examiner is basing the rejection on the assertion that it would have been obvious to do something not suggested in the art based on the advantages disclosed in the applicants' specification. This sort of rationale has

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been condemned by the CAFC as being sophistic; *see e.g. Panduit Corp. v. Dennison Manufacturing Co.*, 1 USPQ2d 1593 (Fed. Cir. 1987). Accordingly, withdrawal of this rejection with respect to independent claims 1, 16 and 17, and associated dependent claims, is respectfully requested.

D. Rejection of Claims 22-27 Under 35 U.S.C. §103(a)

Claims 22-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sudo *et al.* (US 4,644,205) in view of Horikoshi *et al.* (US 5,142,172), Gerard (US 4,751,437) and Spinner *et al.* (US 5,771,174). This rejection should be reversed for at least the following reasons. Sudo *et al.*, Horikoshi *et al.*, Gerard and Spinner *et al.*, either alone or in combination, do not teach or suggest all the limitations set forth in the subject claims.

As stated above, applicants' claimed invention provides a single integrated module comprising all the components of a rotary-linear actuator, *e.g.*, a plunger, air bearings that support the plunger, a coil system and an amplifier as well as the components that comprise the control system. In particular, independent claim 22 recites *a control system and a network interface integrated into a single module, the control system integrated with a rotary-linear actuator, the network interface receiving and transmitting at least one of control and diagnostic information to an associated network.* Sudo *et al.*, Horikoshi *et al.*, Gerard and Spinner *et al.*, fail to teach or suggest these aspects of applicants' claimed invention.

The Examiner concedes Sudo *et al.* fails to disclose a control system and a network interface integrated into a single module whereupon the control system with the network interface is further integrated with a rotary-linear actuator. In order to cure this deficiency the Examiner cites Spinner *et al.* stating at page 16, lines 12-16: "Spinner *et al.* teaches ... each intelligent actuator controller 30 is 'preferably mounted on the body of the actuator [26]' and thus is integrated with the actuator (col. 3, lines 58-60; Fig. 1)."

Applicants' representative respectfully disagrees and submits that while Spinner *et al.* may mount the controller on the body of the actuator, the act of mounting one object on to another object does not constitute integrating one object into another as recited in

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the claims. It is generally recognized that the act of integrating one thing into another renders one discrete entity, rather than having two entities merely attached to one another. Further, *Spinner et al.* recognizes that in mounting the actuator controller on the body of the actuator that there is no integration as it is specifically stated at col. 5, lines 36-39 that the "controller is housed within a sealed enclosure for protection against high humidity, moisture and heat as well as caustic chemicals ...". This would imply that even though the separate and sealed controller is mounted on to the actuator there still remain two distinct entities – the actuator and the sealed controller. In applicants' claimed invention in contrast, once all the components recited in the subject claim have been assembled and integrated together only one entity exists – an integrated rotary-linear actuator system. In view of at least the foregoing, it is respectfully requested that the rejection of independent claim 22 together with claims that depend there from, should be withdrawn.

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CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejections of claims 1-4 and 6-27 be reversed.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

Respectfully submitted,
AMIN & TUROCY, LLP



Himanshu S. Amin
Reg. No. 40,894

AMIN & TUROCY, LLP
24TH Floor, National City Center
1900 E. 9TH Street
Cleveland, Ohio 44114
Telephone: (216) 696-8730
Facsimile: (216) 696-8731

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